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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,016	07/17/2003	Sangheon Lee	LMRX-P019/P1154	4601
32986	7590	12/01/2005	EXAMINER	
IPSG, P.C. P.O. BOX 700640 SAN JOSE, CA 95170-0640			DEO, DUY VU NGUYEN	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 12/01/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/623,016

Applicant(s)

LEE ET AL.

Examiner

DuyVu n. Deo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13-20, 22, 24-31, 33-40 and 42-59 is/are pending in the application.
- 4a) Of the above claim(s) 46-48 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-11, 13-20, 22, 24, 25, 36-40, 42-45 and 49-59 is/are allowed.
- 6) ☒ Claim(s) 26-31, 34 and 35 is/are rejected.
- 7) ☒ Claim(s) 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/7/05.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Olsen et al. (US 6,528,426) and Shih et al. (US 6,797,627).

Olsen describes a method for forming interconnect or dual damascene process comprising: providing a substrate having low-k dielectric layers above SiC etch stop layers, which are disposed above a copper layer (col. 3, line 35-48; col. 4, line 33-68); etching through the dielectric layer using a first etchant such as fluorine-based plasma (col. 4, line 2; col. 5, line 4, 5); etching through the SiC using a second etchant such as Cl₂, which is different from the first etchant, to form openings (col. 4, line 1). Unlike claimed invention, Olsen doesn't describe performing a DI rinse and then a H₂ plasma treatment on the substrate. Shih teaches a same method wherein he teaches of performing a DI rinse and then a H₂ plasma treatment on the substrate (col. 6, line 30-46). It would have been obvious for one skilled in the art to modify Olsen's method in light of Shih's teaching of DI rinse and H₂ plasma treatment because he teaches that these treatments would remove the polymer residues and copper oxide residues from the substrate (ab.).

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Referring to the limitation of using inert gas during the etching of the etch stop layer, it is well known to one skilled in the art to use inert gas such as Ar, He, as a carrier gas as shown in col. 3, line 52 of Olsen (please also see Roberts et al. cited below).

Referring to claim 30, the low-k dielectric layers disclosed by Olsen would have dielectric constant of less than 4.

Referring to claim 29, etching through the etch stop SiC layer is performed through openings in the dielectric layer (Olsen: fig. 1i, 1h).

3. Claims 34, 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Olsen/Leon or Olsen/Shih as applied to claims 13, 26 above, and further in view of Wang et al. (US 6,527,968).

Referring to claims 34 and 35, even though applied prior art above is silent about the type of plasma processing system is used; however such claimed systems of inductively and capacitively plasma system are known to one skilled in the art for plasma treatment of the substrate as shown here by Wang (col. 1, line 7-20), please also see cited art below. Therefore, it would have been obvious for one skilled in the art to use any known system such as capacitively or inductively system in order to provide a plasma for the etching or treatment of the substrate with a reasonable expectation of success.

4. Luo et al. (2002/0005392) is cited to show prior art.

Roberts et al. (US 5,626,775) (col. 5, line 25-30) is cited to show prior art.

Allowable Subject Matter

5. Claims 1-11, 13-20, 22, 24, 25, 36-40, 42-45 are allowed because allowable depending claims have been added into the independent claims.

Claims 49-59 are allowed for the same reason, indicated in the previous action, as that claims 13.

6. Claim 33 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 33 is allowable because applied prior art doesn't suggest performing a HCL solution dip on the substrate prior to rinse using the rinsing solution that includes the DI-water.

Terminal Disclaimer

7. The terminal disclaimer filed on 9/20/05 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. application, 10/623,018 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

8. Referring to applicant's remark about the allowability of claim 32, the content of claim 32 is not allowable. Because it depends on claim 22, which depends on allowable claim 21; therefore, it is indicated allowable along with claims 21 and 22.

9. Applicant's withdrawal of claims 46-48 is acknowledged.

Conclusion

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10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6:00-2:30 Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Primary Examiner
Duy-Vu N. Deo
11/28/05

